IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Michihisa TASAKA et al.

Serial No.: 09/384,380 Group Art Unit: 1713

Filed: August 27, 1999 Examiner: Rip A. Lee

For: FIRE-RETARDANT RESIN COMPOSITION AND MOLDED PART USING THE SAME

DECLARATION UNDER 37 C.F.R. § 1.132

Honorable Commissioner of Patents
and Trademarks
Washington, D.C. 20231

Sir:

I, Kazuhiko KOBAYASHI, declare and state that:

1. I am a Japanese citizen residing at 3-26-7, Sugita, Isogo-ku, Yokohama-shi, Kanagawa-ken, Japan.

I was graduated from Science & Engineering Section, CHUO University in March 1982.

I have been employed by RIKEN VINYL INDUSTRY CO., LTD. (whose name is changed to RIKEN TECHNOS CORPORATION as of October 1, 2001) since April 1982. I engaged in research and development of insulating-materials for electric wires at Compound Technical Department of the said company since April 1985. Further, I have been engaged in research and development of insulating-materials for electric wires in Polymer Application R&D Department at Material Research Center of the said company since April 1998.

I am intimately familiar with the contents of United States Patent Application Serial No. 09/384,380, filed on August 27, 1999,

its prosecution before the United States Patent & Trademark Office, and the references cited therein.

2. I have studied the content of the cited Tasaka et al.'s U.S. Patent No. 5,929,165, Aida et al.'s U.S. Patent No. 5,221,781, and Nosu et al.'s U.S. Patent No. 6,218,454.

3. To show the superiority of the present invention, the following tests were conducted, by me or under my supervision:

Test

Resin compositions, Comparative examples A and B, were prepared in the same manner as in Example 1 in the present specification, except that the ethylene/α-olefin copolymer was changed to another ethylene/α-olefin copolymer, respectively.

That is, in Comparative example A, Excellen VL 200 (trade name, manufactured by Sumitomo Chemical Co., Ltd.), which was very low-density straight-chain polyethylene synthesized in the presence of a multi site catalyst (MFR, 2.0 g/10 min; Density, 0.90 g/cm^3), was used, in place of the ethylene/α-olefin copolymer (c-1) in Example 1 synthesized in the presence of a single site catalyst.

On the other hand, in Comparative example B, IDEMITSU MORETEC 0238N (trade name, manufactured by Idemitsu Petrochemical), which was ethylene/1-octene copolymer as a rather hard raw material synthesized in the presence of a multi site catalyst (MFR, 2 g/10 min; Density, 0.920 g/cm^3), was used, in place of the (c-1) in Example 1 synthesized in the presence

of a single site catalyst.

From the thus-obtained resin compositions, 1-mm sheets, corresponding to Comparative examples A and B, respectively, were obtained in the same manner as described in the EXAMPLES section (lines 11 to 13 on page 55) of the present specification.

Also, from the thus-obtained resin compositions, insulated wires, corresponding to Comparative examples A and B, respectively, were obtained in the same manner as described in the EXAMPLES section (from line 14, page 55, to line 10, page 56) of the present specification.

Furthermore, from the thus-obtained resin compositions, power source plugs, molded by injection-molding, corresponding to Comparative examples A and B, respectively, were obtained in the same manner as described in the EXAMPLES section (lines 11 to 18, page 56) of the present specification.

As to the thus-obtained sheets, the tensile properties (extension (elongation) (%) and tensile strength (MPa)) and the heat deformation property were evaluated, in the same manner as described in the EXAMPLES section (lines 19 to 24, page 56) of the present specification. The results are also shown in Table I below.

Further, regarding the covering layer of the thus-obtained insulated wires, the tensile properties, abrasion resistance, the horizontal flame test, the 60°-inclined flame test, the heat deformation rate test, the whitening test (whether a whitening

phenomenon was observed when bent), the extrudability test, and the flexibility test were carried out, in the same manner as described in the EXAMPLES section (from line 4, page 57, to line 3, page 61) of the present specification. The results are also shown in Table I.

Additionally, for the molded plugs, the horizontal flame test and the 60°-inclined flame test were carried out, in the same manner as described in the EXAMPLES section (from line 22, page 58, to line 8, page 59) of the present specification. Further, for the molded plugs, the whitening test (whether a whitening phenomenon was observed when bent) was carried out, and the moldability was observed, which was judged from observing the outer appearance of the molded products. The results are also shown in Table I.

Further, for reference, the resin composition of Example 1 was used to prepare a power source plug in the same manner as mentioned above, and the plug was tested as well. The results are also shown in Table I. In addition, as the conditions and results for the sheet and the insulated wire of Example 1, as shown in Table 1 in the specification of the present application, are again shown in Table I below. Example 1 employed an ethylene/α-olefin copolymer synthesized in the presence of a single site catalyst.

Table I (Revised)

		Comparative example A	Comparative example B	Example 1
a	SEPS	100	100	100
b	Paraffin oil	40	40	40
c-1	Ethylene/α-olefin copolymer (ethylene/1-octene copolymer synthesized using single site catalyst) (Density, 0.870)	none	none	133
	Ethylene/α-olefin copolymer (very low-density straight-chain polyethylene synthesized using multi site catalyst) (Density, 0.90)	133	none	none
	Ethylene/α-olefin copolymer (ethylene/1-octene copolymer synthesized using multi site catalyst) (Density, 0.920)	none	133	none
d-1	Block polypropylene	33	33	33
e	Organic peroxide	0.66	0.66	0.66
f	Crosslinking aid	2	2	2
	Maleic acid-modified LLDPE	27	27	27
B-1	Kisma 5LH	500	500	500
	Antioxidant	3	3	3
	Lubricant	6	6	6
Properties of the sheet	Extension (%)	210	230	200
	Tensile strength (MPa)	15	17	19
	Heat deformation at 121 °C (%)	13	12	13
Characteristics of the electric wire	Extension (%)	220	240	220
	Tensile strength (MPa)	16	18.5	20
	Horizontal flame test	10/10	10/10	10/10
	60°-inclined flame test	10/10	10/10	10/10
	Abrasion resistance	○	○	○
	Whitening	×	×	○
	Heat deformation (%)	19	18	21
	Extrudability	×	×	○
	Flexibility	×	×	○
Characteristics of the injection-molded plug	Horizontal flame test	10/10	10/10	10/10
	60°-inclined flame test	10/10	10/10	10/10
	Whitening	×	×	○
	Moldability (Outer appearance)	○	○	○

Note: Evaluations (acceptable levels; and, if necessary, unacceptable levels) for each item in Table I.

For sheets:

Extension, 100% or more;

Tensile strength, 10 MPa or more;

Heat deformation, 30% or less.

For insulated wires:

Extension, 100% or more;

Tensile strength, 10 MPa or more;

Abrasion resistance, the number of movements of the blade until it contacted the conductor was 1000 or more (rated "○");

Whitening, after winding 6 times, when no whitening was observed (which was good and rated "○"), on the other hand when whitening was observed 6 times or more (which was poor and practically unpreferable, and rated "×");

Heat deformation, less than 50%;

Extrudability, when extrusion was possible with a normal load and resulted in extruded wire-like product having good outer appearance (rated "○"), on the other hand when the extrusion load was conspicuously large and extrusion was difficult or impossible so that granular structures, such as acne and blobbing, were observed on the extruded wire-like product (which was practically unacceptable and did not pass the test, and rated "×");

Flexibility, the length of the end lowered from the original level was 3 cm or more (which was good and rated "○"), on the other hand when less than 1 cm (which was poor and rated "×").

For molded plugs:

Whitening, after bending, repeatedly 6 times, to make an angle of 90° with a part of the molded plug into which a code is to be inserted, when no whitening was observed (which was good and rated "○"), on the other hand when whitening was observed 6 times or more (which was practically poor and rated "×");

Moldability, when molding was possible with a normal load and resulted in molded plugs having good outer appearance (which was good and rated "○"), on the other hand when molding was difficult or impossible so that poor outer appearance was observed on the molded plug (which was poor and rated "×");

In the results of the horizontal flame test, the number of samples that passed the test (per 10 trials) were shown; and in the results of the 60°-inclined flame test, number of samples that passed the test (per 10 trials) were shown.

As is apparent from the results shown in Table I, each of the sheet, the insulated wire, and the molded plug prepared employing the ethylene/α-olefin copolymer synthesized in the presence of a single site catalyst (Example 1), exhibited unexpectedly superior results in some of the evaluation items, such as tensile strength, whitening, extrudability, and flexibility, compared with those prepared employing the ethylene/α-olefin copolymer synthesized in the presence of a multi-site catalyst (Comparative examples A and B).

Specifically, the wires prepared employing the resin compositions of Comparative examples A and B, respectively, were conspicuously inferior in whitening, extrudability, and flexibility (rated "×") compared with one prepared employing the resin composition of Example 1 (rated "○").

Additionally, the molded plugs prepared employing the resin compositions of Comparative examples A and B, respectively, were conspicuously inferior in whitening (rated "×") compared with one prepared employing the resin composition of Example 1 according to the present invention (rated "○").

Accordingly, it should be apparent that the fire-retardant

resin composition and the molded part according to the present invention, each of which employs an ethylene/α-olefin copolymer synthesized using a single site catalyst, are excellent in each item of the properties including not only mechanical characteristics, such as tensile strength, and heat resistance but also extrudability, flexibility, moldability and whitening.

The data already of record in the specification and the supplemental data submitted herewith demonstrate unexpectedly superior results of the claimed fire-retardant resin composition, molded part, and method for processing fire-retardant resin composition over those of the cited prior art.

4. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: October 16, 2002

Kazuhiko Kobayashi

Kazuhiko KOBAYASHI